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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/519,408	03/03/2000	Takao Nakamura	3905	7245

21553 7590 08/12/2002

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EXAMINER

LOUIE, WAI SING

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 08/12/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/519,408

Applicant(s)

NAKAMURA ET AL.

Examiner

Wai-Sing Louie

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 June 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 16-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 16-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 21.

- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

1. Claim 5 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- In claim 16, 18, and 20-22, the term "n-type transparent conductor film" is an inappropriate term and is not supported by the specification. For the purpose of examination, "transparent conductor film" is assumed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 16, 18-20, and 22 (in so far as they are understood) are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishibashi et al. (US 5,617,446) in view of Kazuyoshi et al. (JP 06-318406).

With regard to claim 16, Ishibashi et al. disclose a semiconductor light-emitting device (col. 3, line 8 to col. 9, line 58 and fig. 2) comprising:

- A substrate 1 provided with an n-type lower electrode on the back surface;
- A light-emitting layer 6 provided on the substrate 1;
- A p-type semiconductor layer 12 provided on the light-emitting layer 6, where the p-type semiconductor layer 12 is a ZnTe-based semiconductor layer;
- An upper electrode 13 and 14 provided on the p-type semiconductor layer 12, where the upper electrode includes an Au thin film positioned in contact with the p-type semiconductor layer 12, but Ishibashi et al. do not disclose a transparent thin film formed on the Au thin film. However, Kazuyoshi et al. disclose a transparent conductive layer, which is made of In and Zn compound (Kazuyoshi [0008]). Kazuyoshi et al. teach that this compound is transparent, conductive, resistant to heat and high humidity, and is suitable to be a transparent electrode (Kazuyoshi [0018]). Hence, it would have been obvious at the time the invention was made to provide Kazuyoshi's transparent conductor layer on Ishibashi's Au thin film to seal the air and humidity from the Au layer.

With regard to claim 18, Ishibashi et al. modified by Kazuyoshi et al. in claim 2 above would have an $\text{In}_2\text{O}_3/\text{ZnO}$ layer on top of the Au thin layer and Kazuyoshi et al. disclose the In_2O_3 is 90% by weight (page 3, paragraph [0014]).

With regard to claim 19, Ishibashi et al. modified by Kazuyoshi et al. would have an In_2O_3 -10wt.% ZnO layer, but they do not disclose the In_2O_3 -10wt.% ZnO layer is formed by laser

ablation. However, this is a process limitation, which carries no patentable weight in a claim drawn to a device.

With regard to claim 20, Ishibashi et al., modified by Woodard et al. in claim 17 above, disclose an Au thin film has a thickness of 0.6 to 30 Å and Ishibashi et al., modified by Kazuyoshi et al. in claim 18 above, disclose an In_2O_3 -10 wt.% ZnO layer. Kazuyoshi et al. disclose the thickness is 10 to 800 nm (Kazuyoshi [0017]).

With regard to claim 22, Ishibashi et al. modified by Kazuyoshi et al. would have an In_2O_3 -10 wt.% ZnO layer. Kazuyoshi et al. disclose the transparent conductor film is form @20°C (Kazuyoshi [0066]).

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishibashi et al. (US 5,617,446) modified by Kazuyoshi et al. (JP 06-318406 as applied to claim 16 above, and further in view of Woodard et al. (US 6,255,003).

With regard to claim 17, Ishibashi et al. do not disclose the thickness of the Au thin film. However, Woodard et al. teach that Au has an effective thickness as thin as one tenth of a full 3 Å thick monolayer (Woodard col. 5, lines 20-24). Woodard et al. disclose the common thickness of a transparent Au thin film is about 1 to 10 Å (Woodard col. 5, lines 24-28) and film 104 in Woodard's device is 0.6 to 30 Å (Woodard col. 5, line 26 and fig. 1). Therefore, it would have been obvious to one with ordinary skill in the art to provide an Au thin film of less than 3 nm thick in order to provide a conductive, transparent film.

Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishibashi et al. (US 5,617,446) modified by Kazuyoshi et al. (JP 06-318406) as applied to claim 16 above, and further in view of Lawrence et al. (US 4,495,514).

With regard to claim 21, Ishibashi et al. modified by Kazuyoshi et al. disclose a multi layer structure upper electrode, but do not disclose the lower layer having a flattened surface and the upper layer having an uneven surface. However, Lawrence et al. disclose an electrode having a thin gold layer, which is a flattened layer, and an uneven upper transparent layer (Lawrence col. 6, lines 44-57). Lawrence et al. teach the thin gold layer could reduce the contact resistance at the electrode-semiconductor interface (Lawrence col. 6, lines 47-50). Therefore, it would have been obvious to one with ordinary skill in the art to provide a thin gold flattened layer and an uneven transparent electrode in order to reduce the contact resistance at the electrode-semiconductor interface.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wai-Sing Louie whose telephone number is (703) 305-0474.

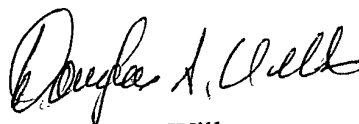
The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



Douglas A. Wille
Patent Examiner



wsl

August 7, 2002